

REMARKS/ARGUMENTS

Claims

Claims 4, 9, and 14 have been canceled. Claim 1 has been amended to incorporate all of the limitations of the original claim 9. Claims 11, 12, and 15 have been rewritten as independent claims including all of the limitations of the base claim and any intervening claims. In addition, additional language was added to claim 15 to more clearly recite that the barrier layer extends from within the oxide layer to the surface of the oxide layer. This is supported by page 7, lines 22-31, of the application. Claims 6 and 7 have been amended to change their dependencies. Claim 18 has been amended to include a limitation that the dopant is implanted. Claims 21 and 22 have been added.

Allowable Subject Matter

The Examiner stated that claims 4-7, 9-12, and 15 were objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The applicants appreciate the Examiner's comments. Claim 1 has been amended to incorporate all of the limitations of claim 9, and is effectively the same as if claim 9 was rewritten in independent form to incorporate all of the limitations of the base claim and any intervening claim. Claims 11, 12, and 15 have been rewritten as independent claims including all of the limitations of the base claim and any intervening claims. For this reason, claims 1, 11, 12, and 15 are in condition for allowance.

Claim Rejection under 35 USC 103

The Examiner rejected claims 1-3, 8, 13, 14, 16, 17, and 18-20 under 35 U.S.C. 103(a), as being unpatentable over Zhao et al. (6,261,963) in view of Swanson (3,710,205) further in view of Carlson et al. (3,632,438) further in view of Stumborg et al. (6,211,066). Regarding claim 1, claim 1 has been amended to incorporate all of the limitations of claim 9, and therefore is believed to be allowable.

Regarding claim 18, claim 18 has been amended to further recite that the dopant is implanted in the silicon oxide layer using at least one of ion implantation and plasma implantation. In addition, new claim 21 recites the step of implanting ions into the silicon oxide layer, where claim 22 further recites that the implantation is at least one of ion implantation or plasma implantation. These limitations are supported on page 7, lines 22-31, and page 8, lines 16-22, of the specification. Swanson does not support such ion implantation. Instead, Swanson in col. 5, lines 1-6, deposits the dopant on the upper surface of the silicon oxide layer. Implantation provides improved copper barrier abilities. For at least these reasons, claims 18, 21, and 22 are not made obvious by the cited references.

Claims 2, 3, 8, 13, 16, 17, 19, and 20 each depend either directly or indirectly from the independent claims and are therefore respectfully submitted to be patentable over the art of record for at least the reasons set forth above with respect to the independent claims. Additionally, these dependent claims require additional elements that, when taken in the context of the claimed invention, further patentably distinguish the art of record. For at least these reasons claims 2, 3, 8, 13, 16, 17, 19, and 20 are not made obvious by the cited references.

Applicants believe that all pending claims are allowable and respectfully request a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,

BEYER WEAVER & THOMAS, LLP

A handwritten signature in black ink, appearing to read "Michael Lee", with a stylized, flowing script.

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